QP Code: P25DR005

Reg. No : .....
Name : .....

ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20

I SEMESTER (CBCSS-PG) DEGREE REGULAR EXAMINATIONS, NOVEMBER 2025
M. Sc. Computer Science
CSS1C05 : COMPUTER ORGANIZATION AND ARCHITECTURE
2025 Admission Onwards

Time: 3 Hours **Maximum Marks: 30**

Section A

Short answer type questions. Answer **any four**. Weightage **2** for each.
(4x2 = 8 Weightage)

1. Simplify the Boolean function using a K-map:F(P,Q,R,S) = Σ(1, 2, 4, 7, 10, 12, 13, 15).
2. Convert the binary number 101101.1101 into octal, hexadecimal and decimal equivalents.
3. Explain how arithmetic and logic operations are performed using register transfers.
4. Describe the different types of instructions categorized by instruction length.
5. Draw the block diagram for hardware implementation of addition of positive numbers.
6. Describe the organization of a memory cell with a neat diagram.
7. A microprocessor is executing a program of 100,000 instructions. Each instruction takes 10 T-states. If the clock frequency is 8 MHz, calculate the total execution time.

Section B

Short essay-type questions. Answer **any four**. Weightage **3** for each.
(4x3 = 12 Weightage)

8. Compare and contrast sign-magnitude, 1’s complement, and 2’s complement representations.
9. Write notes on single-bus, two-bus, and three-bus CPU organizations in detail.
10. Explain the concept of bit pair recoding.
11. Compare and contrast the various cache mapping techniques with examples.
12. List out and explain different types of interrupts.
13. Explain the functional units in the 8086 architecture.

Turn Over

14. Explain the architecture of the 8051 microcontroller in detail.

Section C

Essay-type questions. Answer **any two**. Weightage **5** for each.
(2x5 = 10 Weightage)

15. Design and implement an 8-to-3 Encoder and a 3-to-8 Decoder. Provide their truth tables and logic circuit diagrams.
16. Differentiate between restoring and non-restoring division algorithms with suitable examples.
17. Summarize the working of a DMA controller with a neat diagram.
18. Write a detailed note on the instruction set of the 8086 microprocessor.

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